

OCTOBER 29.

DR. C. NEWLIN PEIRCE in the Chair.

Ninety-one persons present.

A paper entitled, "Synopsis of the North American Species of *Gorytes Latr.*," by Wm. J. Fox, was presented for publication.

The death of Louis A. Harlow, M. D., a member, was announced.

The Publication Committee reported in favor of the publication of the following papers in the *Journal of the Academy*:

"Certain River-mounds of Duval County, Florida." By Clarence B. Moore.

"Two Mounds on Murphy Island, Florida." By Clarence B. Moore.

"Certain Sand Mounds of the Ocklawaha River, Florida." By Clarence B. Moore.

*A preliminary account of the Re-exploration in 1894 and 1895 of the "Bone Hole," now known as Irwins' Cave, at Port Kennedy, Montgomery County, Pennsylvania.* MR. HENRY C. MERCER remarked that when Dr. Samuel G. Dixon of the Academy kindly put him in charge of the excavation at Port Kennedy in November of last year, (after Mr. D. N. McCadden, having found fossils in a dump heap, had called attention to the deposit, and after Mr. S. N. Rhoads had excavated there for some time) he, the speaker, soon learned that they were once more at the old so-called "Bone Hole" of Port Kennedy. This was the place referred to by Mr. C. M. Wheatley, who gives a cut of it in the *American Journal of Science and Arts* for April, 1871, and where he collected the bones described by Prof. Cope in the *Proceedings of the American Philosophical Society* for April, 1871. A recent lowering of the quarry floor had brought the workmen to the same soft place that they had reached twenty-five years before. They were twelve feet deeper than Mr. Wheatley had been at the previous time, in a gallery filled up with stratified rubbish, whose roof, if it had a roof, had been blasted away, whose bottom had never been reached and whose horizontal extent no one can guess. They were not standing in the darkness under a rock arch, but in the open quarry, forty-five feet below the original surface of the hill, at the very bottom of the quarried area, and below its water level, so deep that the drainage hole close by had to be pumped out day and night to keep the floor dry. A great mass of red talus, unfortunately dumped exactly upon the deposit, overhung them ready to fall as the digging went on.

The explorer was confronted by a vertical bank about twenty-five feet wide by twelve feet high and striped with colored bands of

stratification and it was the great number and variety of the bones of animals that protruded from it in all directions that first astonished him. The bones lay in the red clay and black earth with fragments of limestone and bits of shale, broken, crushed, ground into a sort of meal, or flattened by the down-settling of the earth, often oozing full of water like a soaked sponge, and falling to pieces when touched, so that they had to be cased in shells of plaster of paris, to be removed. All that was seen was scattered and dislocated; no skeleton lay together, nor had the marks of gnawing teeth been found upon any of the bones to indicate a den of carnivorous beasts, while the kind and proportion of the remains further dispel the latter idea. The country, which for this reason they might infer was thickly wooded, must have been thickly inhabited by sloths, judging from the astonishing number of their bones, and as inferentially from modern species neither this animal nor the tapir, buried with it, endured cold, the climate was probably warm or temperate. Animals large and small, fierce and gentle, lay together, the cumbrous mastodon whose bones had been ground to powder, or dislocated and crushed, at the bottom of the digging along with the rabbit and the turtle. Professor Cope had shown that there were feline carnivores and abundant bears, and they had found the saber-toothed tiger with the bones of birds and the remains of the gentler horse, the beaver, and the llama. What was the power that destroyed the creatures, and what the event that brought together their bones and buried them in one place?

Not to anticipate a description that ought to be very carefully given of the position and contents of this remarkable deposit, of the way the jaws and the teeth, the knuckles and the vertebrae of these inhabitants of land and water, earth and air lay together, of the relation of all the bones to the stratified bands of clay and stones, and of the position of the whole with reference to the surface of the hill, and to the other galleries and chambers that had been continually revealed by blasting, let it be said, that every blow of the pick-axe, destroying as much as it saved in the thick mass, revealed the action of water, which, it seems, must have overswept the hill-top since it could not have crept up to do its work by seeking its level through a longer ingress, and which, for other reasons to be explained, must have worked upon a large scale. Was it an immense rising of the river swollen by the down-washing from the glacier? Was it a wider sinking of the whole eastern continental floor when the sea invaded the land during the Champlain period? If so, where were the marine shells, which thus far the speaker had failed to find? Was it a gradual thing or a sudden and terrible catastrophe, driving together beasts forgetful for the time of their animosities, toward some common refuge. He might refer the carbonizing of the wood to vegetable decomposition; should he appeal to the action of ice to account

for great thick blocks of wood, still undecomposed, cut out of trees, and though rubbed and rounded in an inexplicable manner, still retaining their bark? Aware that he was probably dealing with a situation such as had never before been presented in the seaboard region, and not certain what might be disclosed at any moment, he had taken the most minute care of all the bones that could be saved, labelling everything at once, according to a system of numbered rectangles painted on the deposit with white-wash so that the exact relative position of each specimen could be recorded and a chart made, if need be, to show the whole series in place at a glance.

Here was an immense deal of evidence sealed up, every item of which should offer an important clue to the conditions of pleistocene time. The matrixes sent in bulk in boxes, because they contained too many small remains to be opened at the cave, should be studied by a botanist. There were parts of trees, twigs, and possibly grasses, leaves, vines, fibres, nuts and seeds, all as clearly a part of the time and its climate as the animals.

Several suppositions were necessary to account for what was seen:

*First.* This diverse and uncongenial horde of animals must have come together, whether to eat salt, feed, drink, cross a swamp and perish in the mire, fall into a hole, or to take refuge at some point of vantage from some terror of nature.

*Second.* They perished, but how? Should the entombment be referred to wholesale destruction by lightning, carcasses dragged into an open cavern by carnivores, or numbers of animals going to one spot to die? If it was drowning on a large scale, how account for the birds and the turtles?

*Third.* The flesh decomposing had left the bones, and the bones themselves had decayed in many instances before they were redeposited in the cave. This was certain from the fact that no skeletons lay intact.

*Fourth.* Water had redeposited the already fleshless and weakened bones in their present position, grinding many of the older and more fragile into a sort of meal, imbedding others comparatively intact in this meal, depositing all in hopeless confusion with clay and stones in stratified bands, and destroying them still farther by the down-settling of the debris after they had reached their present position.

There seemed to be no mixing of epochs or down-washing of old and new deposits into this deep chasm. Whatever else was inferred from the debris they knew its geological date. They had gone back one geological step, into different conditions of species, and a different climate. If they were to find a paleolithic ape-like savage in eastern North America this was the place to settle his antiquity beyond all reasonable doubt. No trace of humanity had yet been

found, but if Man were living at this time they might suppose that the waters which gathered together and poured into this tomb so many living creatures seized him also, and that at some unexpected moment, they should find a piece of his skeleton, or a fragment of his handiwork to prove it. Port Kennedy represented the meeting ground between anthropology and paleontology, where perhaps from the point of view of the latter larger science, it was sufficient to gather the bones, and identify the species, but anthropology asked for more. It must have everything measured and in place. On the alert for the sudden apparition of Man, it must know how, when, why, by whom, and under what circumstances all these objects were found. No more of the doubt that beclouded the classic deposits at Natchez, Miss., or Trenton, N. J., that perplexed the student who went to Stockholm and tried to get at the real meaning of the bones that Lund supposed he found associated with pleistocene fossils in the Minas-Geraes Caverns in Brazil. No more of the uncertainty that obscured at first the investigations at Gailenreuth, where pottery and charcoal seemed to be mixed with the bones of the Cave Bear, or at other caverns in Belgium, England and France, where for a long time science concerned itself with the species of animals found, and not with the human remains associated with them. If *Homo sapiens* were found at Port Kennedy the fact and its significance could well be established beyond all controversy, but since Dr. Dixon and the speaker had begun excavation there a year ago, and after working at the spot for more than a month last autumn, and during several recent weeks, the latter felt that it would be safe to say that not one-third of the deposit had been removed, though he himself had dug out about 300 cubic yards, and Mr. Rhoads had removed as much previously.

Thanks were due to Mr. Archibald Irwin, the owner of the quarry, for the privilege accorded by him of exploring the deposit. With his co-operation the work advanced. Meanwhile it was eminently desirable that means should be furnished for the farther exploration of this most important pleistocene record.

*The Fossil Vertebrata from the fissure at Port Kennedy, Pa.* PROF. EDW. D. CORE made the following remarks on the contents of the cave at Port Kennedy, and especially on the fossil remains of vertebrata presented to the Academy by Dr. S. G. Dixon and Mr. H. C. Mercer. The fissure was exposed in 1870 by the workmen engaged in quarrying the Cambrian limestone (Calceiferous epoch), and Mr. C. M. Wheatley had published an account of it in the American Journal of Science and Arts. He collected numerous fossils, which were the subject of a paper by the speaker, which was published in the Proceedings of the American Philosophical Society

for 1871. The number of species determined at that time was thirty-four.

The specimens now received were derived from another part of the same fissure, which had been exposed by further excavations by the quarrymen. The first to come to hand were obtained by Dr. Dixon and Mr. S. N. Rhoads, but subsequently a large amount of material had been taken from the deposit by Mr. H. C. Mercer, who had carefully noted the position of every specimen. The observations now made by Prof. Cope were based on not more than half the material obtained, and could be regarded as only preliminary to a full report which he hoped to make at a future time.

The species obtained so far, including those of the collection of 1870, are as follows: *Batrachia*, undetermined, one sp., *Testudinata*, three species; *Ophidia*, two species; *Aves*, two species; *Mammalia*, *Edentata*, five species; *Glires*, twelve species; *Insectivora*, one species; *Carnivora*, fourteen species; *Proboscidea*, one species; *Diplarthra*, seven species; total, forty-eight species. Subtracting three species from the list of 1871 as not well founded, we have an addition of seventeen species made by the present exploration. Of these additions ten species are Carnivora.

Characteristic peculiarities of the association of species are the following: The most abundant of the large mammals is the tapir, *Tapirus haysii* Leidy. The next most abundant is the bear, *Arctotherium pristinum* Leidy. Probably the skunk, *Mephitis mephitis* L. is the next most numerously represented. If we regard the sloths of the genus *Megalonyx* as representing one species, they are the most numerous in individuals, but there are several species. *Equus major* Dek. and *Mastodon americanus* Cuv., in both young and adult individuals, are not rare. The remains of *Elephas* have not been found, and the first collection only contains *Mylodon*. Peccaries of two species are not uncommon; while a few individuals of a deer occur, and a single tooth of a rather large cameloid. The Glires of the new collection had not been investigated, but there is a left ramus mandibuli of a beaver which is very near to, if not identical with, the *Castor fiber*, a species not contained in the collection of 1870. No fragments of opossum have been found, and raccoon is very rare.

More attention has been given to the Carnivora of the collection. The *Arctotherium pristinum* is of South American type, and is widely different from the existing North American bears. Associated with it are remains not distinguishable from the common black bear, *Ursus americanus*. A few teeth and bones are not distinguishable from those of the wolf, while two species of foxes are represented by two molar teeth, one of which is not distinguishable from the corresponding part of the gray fox, *V. cinereoargenteus*. Fragments of sectorials are closely similar to those of *Bassariscus astutus*, and fragments represent a weasel, *Mustela*. The cats are represented



by four species, of which the most abundant is the red lynx, *L. rufus*. There is a smaller cat represented by mandibular ramus, which resembles in characters and in size the corresponding parts of the eyra, with which it seems to be identical. There are three inferior premolars, and perhaps a part of a superior sectorial of a cat of the size of the jaguar, which appears to be new to science; and there are several teeth and a part of the lower jaw with teeth, of the large saber-tooth which has been called *Smilodon gracilis* Cope. Finally a lower sectorial and a premolar indicate an ally of the hyænas; which is described below as *Crocota inexpectata*. The following are the descriptions of the new forms:

*UNCIA MERCERII* sp. nov. This species is represented by three premolar teeth of the lower jaw which belong to two individuals. The posterior part of a superior sectorial tooth accompanies these remains, and may belong to the same species. These teeth belong to an animal of the dimensions of the jaguar, and the inferior premolars have the posterior heel and lobe, and anterior basal lobe, well developed. The horizontal section of the principal cusp is lenticular, without much difference in the degree of convexity of the outlines. The teeth differ from those of both the jaguar and puma in the greater elevation of both the posterior heel and lobe, which are separated from each other by deep incisions. The posterior part of the crown is narrower posteriorly, especially in the anterior tooth, which differs more in all the points mentioned than does the posterior tooth. Enamel smooth. Length of crown of p. m. I, 21 mm.; width of do. posteriorly 9 mm.; elevation of do. 14 mm. Length of crown of p. m. II, 16 mm.; width of do. 7.5 mm.; elevation of do. 8.5 mm. This species is smaller than the *Uncia atrox* Leidy, which equals the lion, and which differs also in the much simpler character of the second premolar. It is dedicated to Mr. Henry C. Mercer in recognition of his indefatigable labors in cave exploration.

*SMILODON GRACILIS* Cope, American Naturalist, 1880, p. 857. This saber-tooth is represented by a considerable part of a superior canine tooth, from which more than half of the apex has been broken off. At the same time and place were found an entire left superior sectorial; part of a second left superior sectorial; part of a right mandibular ramus containing the sectorial and first premolar teeth; the crown of a second left inferior sectorial, and three incisors. There are several bones in the collection, including ungual phalanges, which probably belong to the same animal.

This is the largest feline discovered in the formation, equaling the *Machverodus cultridens* of the European caves, but not reaching the dimensions of the South American *Smilodon neogacius*. The edges of the crown of the canine, of which 20 mm. are preserved, are not denticulate. The anterior lobe of the superior sectorial is large, but the preanterior lobe is very small. The protocone forms an

angular process, but has no distinct apex; its base displays the origin of a separate root. The inferior sectorial has no trace of heel. The first premolar is short and robust, and has a short but well-defined heel, and well-marked but not elevated posterior lobe. The principal cusp is elevated and robust, with lenticular section with outlines of very unequal convexity. In a probable second specimen of this tooth, the anterior lobe is distinct, acute edged, and little elevated. Incisors short, hooked, and with basal lobe at one side only.

The length of the fragment of the superior canine measures 111 mm.; anteroposterior diameter at base of crown 27 mm.; do. at 30 mm. from base 24 mm.; transverse diameter at do. 11 mm. Anteroposterior diameter of superior sectorial 31 mm; greatest width (at protocone) 14 mm. Anteroposterior diameter of inferior sectorial, 23 mm.; do. of p. m. I, 20 mm. (restored).

This species differs from the *S. floridanus* Liedy, in the much greater compression of the superior canine tooth, while the general dimensions are similar.

*CROCUTA INEXPECTATA* sp. nov. This species is represented by a right inferior sectorial in good preservation. It resembles a good deal that of *Crocuta maculata*, and agrees with it in the absence of trace of metaconid. The cutting heel is rather longer than in that species, and the cingulum which is so conspicuous in it is wanting in the fossil tooth. The paraconid and protoconid are well elevated and equal. Anteroposterior diameter of crown 24 mm.; do. of do. exclusive of heel 19 mm.; elevation of paraconid 10 mm.

The occurrence of a hyena in this collection is unlooked for, but was rendered less incredible by the discovery of a species of this family, *Barophagus diversidens*, in the pliocene bed of Texas. There is an alternative to the identification of this species as *Crocuta*, and that is that it might belong to the genus *Nimravus*. As this genus belongs to the middle Miocene, it is extremely improbable that it should have a representative in the Pleistocene fauna, although the survival of this form of sectorial tooth in connection with modern feline characters in other respects is not an impossibility.

Of the forty-eight species contained in the collection eleven have not been finally determined. Of the thirty-six determined species nine, or twenty-five per cent., are still existing, and the remaining twenty-seven are extinct. Of the existing species eight are nearctic, and one, *Felis eyra*, is neotropical. Of the extinct species ten are of nearctic type, and ten are of neotropical type; the remaining six species being indifferently one or the other, except the *Crocuta*, which is of old world type. The presence of *Equus major*, and of the beaver, connects the fauna directly with that of the Equus beds of the West and Southwest, with which the *Megalonyx* fauna, as he had called this one, was probably contemporaneous. These faunas were separated by a long interval of time from the

later ones whose remains, including those of Man, have been found in so many caves by Mr. H. C. Mercer. The speaker had suggested<sup>1</sup> that this interval was marked by the Champlain depression during which the Columbia gravels and other formations of gravel and clay were deposited, and he had hence designated the caves of the two ages as Prechamplain and Postchamplain.

As regards the mode of occurrence of the remains of this fauna the following remarks were made. No single cave deposit has been found as yet which contains so large a number of species as the subject of this communication, although those of Brixham in England and Gailenreuth in Bavaria, contained as many or more numerous individual animals. As the majority of the species at Port Kennedy are not cave-dwellers, and many of them, as the mastodons and sloths, cannot well have been dragged there by carnivorous species, the question arises as to how the accumulation came about. The bones show no signs of gnawing, nor of wear, as though they had been transported. At the same time two bones have been rarely found in their normal relations in the skeleton. The fissure has been exposed for some twenty feet from the summit, but the bottom has not been reached, chiefly on account of the quantity of water present. The scattered and mixed relations of the bones are identical with the conditions he had found to exist in caves containing the same fauna in Southwest Virginia and East Tennessee. No local conditions will therefore account for a phenomenon so widespread.

Without evidence of a conclusive character, the impression which he had gathered from the facts is as follows: He suspected that the larger animals at least fell into this fissure during a long period. Many of the smaller ones may have entered it from entrances now filled by debris. Animals frequently resort to caves to die. A gallery of fifty feet in length which is large enough to admit a man standing nearly erect, in the Marble cave in South West Missouri, was found to be packed for a considerable part of its length by mummied raccoons who had apparently crawled in there. At the period of submergence of the Champlain epoch, floods of water from melting ice poured into the fissure, and filled it to the mouth with debris, churning up the contents already there, and carrying in logs and other vegetable matter. The stratification of the deposit may be thus accounted for, as also the presence of worn and unworn stones. In the lower part of the deposit vegetable debris and forest mold predominate, which contain seeds and nuts. This deposit apparently represents the long period during which the fissure was open.

<sup>1</sup> American Naturalist, 1895, p. 598.



*The Port Kennedy Deposit.* PROF. ANGELO HEILPRIN, commenting upon the evidence that had been submitted regarding the age of the deposit, believed that special caution was necessary in assigning to the debris a definite geological position. To him the large number of extinct or Neotropical forms indicated more nearly a Pliocene rather than Post-Pliocene fauna—at all events a fauna whose culmination preceded the Glacial Epoch—and he was hardly prepared to accept them as a part of the fauna of the region which survived the melting of the ice. The correspondence was with the Pampean fauna of the southern continent, and this he was also inclined to believe to be (as Prof. Cope himself had years before announced) Pliocene. Prof. Heilprin said that he was not yet a convert to the Columbian gravel theory, regarding which far too much uncertainty existed to permit it to be accepted as a broad chronological element in geological history. He thought it not unlikely that the remains in question had been subjected to redistribution by the glacial flood of the Delaware River Valley, the high back-water of which must have penetrated far into the valley of the Schuylkill, and into the very region of Port Kennedy.

The Recording Secretary read the following:—